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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,219	06/19/2001	Kars-Michiel Hubert Lenssen	NL 000361	3007

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EXAMINER
STRECKER, GERARD R

ART UNIT	PAPER NUMBER
2862	

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/884,219	Applicant(s) LENSSEN ET AL.	
	Examiner Gerard Strecker	Art Unit 2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *8/04/03* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disp sition of Claims

4)☒ Claim(s) *1 and 3-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/4/03 has been entered.

Claims 1 sand 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (6,275,363) in view of Olivas et al (6,507,187), Sano et al (6,430,012) and Sasaki et al (6,563,681).

Gill (6,275,363) discloses (Figs. 11, 12) a magneto-resistive device comprising a free (212) and a pinned (206) ferromagnetic layer separated by a non-magnetic copper spacer layer 304 (Fig. 12) therebetween. The pinned layer comprises a layer system having three (230, 232, 236) non-adjacent ferromagnetic layers in the form of a stack. The layers may all be Co or CoFe, or apparently any permutation thereof. An exchange biasing layer 244 is adjacent the layer system and magnetically influences the layer system. Each of the intermediate layers (228, 234) is a Ru layer. Gill (6,275,363) does not disclose that the copper spacer layer is contiguous on both sides with a CoFe layer, as recited in claim 1.

Olivas et al (Fig. 2) discloses a multi-layer magneto-resistive device in which a copper layer 150 is deposited between a Permalloy layer 130 and an iron manganese layer 170. The copper layer is contiguous on both sides with cobalt layers 140 and 160. The cobalt layers are deposited to separate the mixing of Permalloy and copper and the mixing of iron manganese and

copper (col. 7, lines 29, 30), and to prevent diffusion of the Permalloy and copper and boost GMR ratio (col. 5, lines 10-12).

Sano et al discloses (Fig. 1) a multi-layer magneto-resistance device comprising a metal layer 30, which may be copper (col. 10, lines 13-16), adjacent a free magnetic layer 20, which may be formed of FeNi (col. 9, lines 43-45). The layer 20 is formed with a Co, or an alloy containing Co, layer contiguous to the metal layer to prevent diffusion (of Ni) from the layer 20 toward the metal layer (col. 9, lines 49-65) and improve MR ratio. The teaching of Sano et al that the diffusion prevention layer may be an alloy containing cobalt would imply that the alloy be a CoFe alloy since iron is a typically chosen alloy component for the various layers of magnetoresistance devices.

Sasaki et al (Fig. 1) discloses a magnetoresistance device in which a metal (Cu) layer 30 is deposited between a ferromagnetic layer 40 and a soft magnetic layer 22. A soft magnetic diffusion blocking layer 21 is provided and is contiguous on a side of the metal layer adjacent soft magnetic layer 22. The layer 21 functions to prevent the diffusion of Ni components from the soft magnetic layer 22 and may be made of Co or CoFe. See col. 7, lines 3-12.

It would have been obvious to one skilled in the art at the time of the invention to provide the magnetoresistive device of Gill (6,275,363) with CoFe layers contiguous on both sides of the copper layer, as suggested by the combined teachings of Olivas et al, Santo et al and Sasaki et al. Provision of such layers would be motivated by the desired goals of eliminating diffusion of Ni components at layer interfaces and enhancing the MR ratio of the device. Further, to make the

ferromagnetic layers of Gill (6,275,363) outside the stack thinner or thicker than the center layer (claims 7, 8) would have been obvious as merely a routine design expedient in consideration of optimum size desirabilities and magnetic coupling requirements for the device.

Claims 1, 3 and 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (6,219,209) in view of Olivas et al, Sano et al and Sasaki et al.

Gill (6,219,209) discloses (Fig. 7) a magneto-resistive device comprising: a substrate (725) which carries a free (718) and a pinned (720) ferromagnetic layer, said pinned layer comprising a layer system (720) including a stack of three (750, 854, 758) ferromagnetic layers and two (752, 756) intermediate non-magnetic layers. The layer 750 is formed of Co, and layers 754 and 758 may be formed of CoFe (column 7, lines 19-33). The free and pinned layers are separated by a copper (Cu) spacer layer 722 (column 7, lines 34-36). The intermediate layers 752 and 756 are formed of Ru (column 7, lines 21-25) as called for in claim 4. An exchange biasing layer (AFM layer 724) is arranged adjacent the layer system 720 between the substrate 725 and the layer system, and magnetically influences the system. Since the thickness of the ferromagnetic layers may be within a range (column 7, lines 19-33), selection of different thickness for the individual-layers (claim 7 and 8) would be implicit. Magnetoresistive devices of the type disclosed by Gill are conventionally manufactured for use in data storage systems (claim 9) and as magnetic memories (claim 10). Gill (6,219,209) does not disclose the copper layer being contiguous on both sides with a CoFe layer, although Co layer 750 is contiguous on one side of the copper layer 722.

Olivas et al, Sano et al, Sasaki et al and Gill (6,273,363) are discussed above.

It would have been obvious to one skilled in the art to provide the magnetoresistive device of Gill (6,219,209) with CoFe layers contiguous with the copper layer on both sides thereof, as suggested by the combined teachings of Olivas et al, Sano et al and Sasaki et al, to prevent diffusion of Ni components and to enhance MR ratio.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gill (6,219,209) in view of Olivas et al, Sano et al and Sasaki et al as applied to claims 1 and 3 above, and further in view of Gill (6,275,363), discussed above.

It would have been obvious to one skilled in the art to make all three of the ferromagnetic layers of Gill (6,219,209) CoFe layers, as merely the implementation of a recognized option, as taught by Gill (6,275,363), to enhance the overall functioning of the magnetoresistance device.

Applicant's arguments with respect to claims 1 and 3-11 have been considered but are moot in view of the new ground(s) of rejection.

Hasegawa et al and Durlam et al are made of record to show magnetoresistive devices with CoFe diffusion preventing layers.

Any inquiry concerning this communication should be directed to G. R. Strecker at telephone number 305-4937.

Gerard R. Strecker

GERARD R. STRECKER
PRIMARY EXAMINER

Strecker/ek